

## IN THE CLAIMS:

1. (currently amended) An all-optical converter (10) for converting an optical signal modulated in intensity into an optical signal modulated ~~to the~~ in DPSK format, ~~characterized in that wherein it said all-optical converter comprises:~~

- (a)[[-]] a first input (152a) for inputting a first intensity-modulated optical signal (12);
- (b)[[-]] a differential encoding module (100) adapted to perform a differential encoding between the first signal (12) and a second optical signal synchronous with the first signal (12);
- (c)[[-]] a device adapted to modulate (200) the phase of an optical signal (16) according to the differential encoding performed by the differential encoding module (100); and
- (d)[[-]] an output (162e) of the device adapted to modulate (200) delivering an optical signal modulated ~~to the~~ in DPSK format (14).

2. (currently amended) The all-optical converter (10) according to claim 1, ~~characterized in that wherein~~ the differential encoding module (100) performs the differential encoding using an exclusive-OR function and a feedback loop (30).

3. (currently amended) The all-optical converter (10) according to claim 2, ~~characterized in that wherein~~, in order to implement the exclusive-OR function, the differential encoding module (100) comprises:

- (a)[[-]] a first optical coupler (102) whose first input (152a) is supplied with the first signal (12), whose second input (152b) is supplied with the second signal and whose second output (152d) is not connected;
- (b)[[-]] a second optical coupler (104) whose first input (154a) is supplied by the a first output (152e) of the first coupler (102), and whose second input (154b) is not supplied;
- (c)[[-]] an absorbing non-linear device (110) whose input is supplied by the a second output (154d) of the second coupler (104); and

(d)[[-]] a third optical coupler (106) whose first input is supplied by a the first output (154e) of the second coupler (104), whose second input (156b) is supplied by the output of the absorbing non-linear device (110), whose second output (156d) is not connected and whose first output (156e) delivers the signal representing the result of the exclusive-OR function.

4. (currently amended) The all-optical converter (10) according to claim 3, ~~characterized in that~~ wherein the differential encoding module (100) comprises a fourth optical coupler (108) whose first input (158a) is supplied by the first output (156e) of the third coupler (106), whose second input (158b) is not supplied, whose first output (158e) supplies the device adapted to modulate (200) and whose second output (158d) supplies the feedback loop (30).

5. (currently amended) The all-optical converter (10) according to claim [[2]] 4, ~~characterized in that~~ wherein the second synchronous optical signal is delivered by the feedback loop (30).

6. (currently amended) The all-optical converter (10) according to claim 5, ~~characterized in that~~ wherein the feedback loop (30) comprises an optical phase shift device (112) and an optical amplifier (114).

7. (currently amended) The all-optical converter (10) according to claim 6, ~~characterized in that~~ wherein the feedback loop (30) also comprises a tuneable optical delay device (116) adapted to delay the second signal with respect to the first signal (12) with an integer number of bit times.

8. (currently amended) The all-optical converter (10) according to claim 7, ~~characterized in that~~ wherein the device adapted to modulate (200) comprises a coupler (202) whose first input (162a) is supplied by the signal encoded by the differential encoding module (100), whose second input (162b) is supplied by a signal out of phase by  $\frac{\pi}{2}$  with respect to the encoded signal, whose second output (162d) is not connected and whose first output (162e) delivers an optical signal modulated to the in DPSK format (14).

9. (currently amended) The all-optical converter (10) according to claim 8, ~~characterized in that wherein~~ the device adapted to modulate (200) comprises, upstream of its second input (162b), a tuneable optical delay device (206) adapted to delay the out-of-phase signal with respect to the encoded signal with an integer number of bit times.

10. (currently amended) The all-optical converter (10) according to claim 8, ~~characterized in that wherein~~ the phase of the optical signal modulated ~~to the~~ in DPSK format (14) varies from zero to  $\pi$  according to the result of the exclusive-OR function.

11. (currently amended) The all-optical converter (10) according to claim [[1]] 8, ~~characterized in that wherein the optical~~ said couplers (102, 104, 106, 108, 202) are 3 dB optical couplers.

12. (currently amended) The all-optical converter (10) according to claim [[11]] 8, ~~characterized in that wherein~~ the first signal (12) has an amplitude of  $E_0$  and the second signal has an amplitude of  $E_0$  and a phase difference of  $-\frac{\pi}{2}$  with respect to the first signal; ~~characterized in that and wherein the an optical amplifier, comprised in said all-optical converter, (114) has a gain of 12.04 dB; characterized in that and wherein~~ the absorbing non-linear device (110) comprised in said all-optical converter, has a threshold slightly greater than  $\alpha^2 E_0$  with  $\alpha = \frac{\sqrt{2}}{2}$ ; in that ~~a~~ the signal supplying the second input (162b) of the coupler (202) of the device adapted to modulate (200) has an amplitude of  $\frac{\alpha^4}{2} E_0$  and a phase shift of  $\frac{\pi}{2}$  with respect to the a signal supplying the first input (162a) of the coupler (202) of the device adapted to modulate (200).